

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
02.07.2003 Bulletin 2003/27

(51) Int Cl.7: **G06T 17/20**

(43) Date of publication A2:
07.03.2001 Bulletin 2001/10

(21) Application number: **00115915.1**

(22) Date of filing: **25.07.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE
 Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **01.09.1999 US 388339**

(71) Applicant: **MITSUBISHI DENKI KABUSHIKI**
KAISHA
Tokyo 100-8310 (JP)

(72) Inventors:
 • **Pfister, Hanspeter**
Somerville, Massachusetts 02143 (US)
 • **van Baar, Jeron**
1788 VR. Den Helder (NL)
 • **Oosterbaan, Collin E.**
2461 SK Langeraar (NL)

(74) Representative: **Pfenning, Meinig & Partner**
Mozartstrasse 17
80336 München (DE)

(54) **Method for interactively modeling graphical objects**

(57) A method generates a representation of a graphic object in a memory. A surface of the object is partitioned into a plurality of cells having a grid resolution related to an image plane resolution. A single zero-dimensional surface element is stored in the memory for each cell located on the surface of the object. A subset of the surface elements are selected as primary surface elements. The unselected surface elements are identified as secondary surface elements. Adjacent primary

surface elements are connected by links. Primary attributes of the portion of the object contained in a particular cell are assigned to the associated primary surface element and the links of the associated primary surface element. The unselected surface elements are partitioned into groups, there being one group for each primary surface element, and secondary attributes of the portion of the object contained in a particular cell are assigned to the associated secondary surface elements.

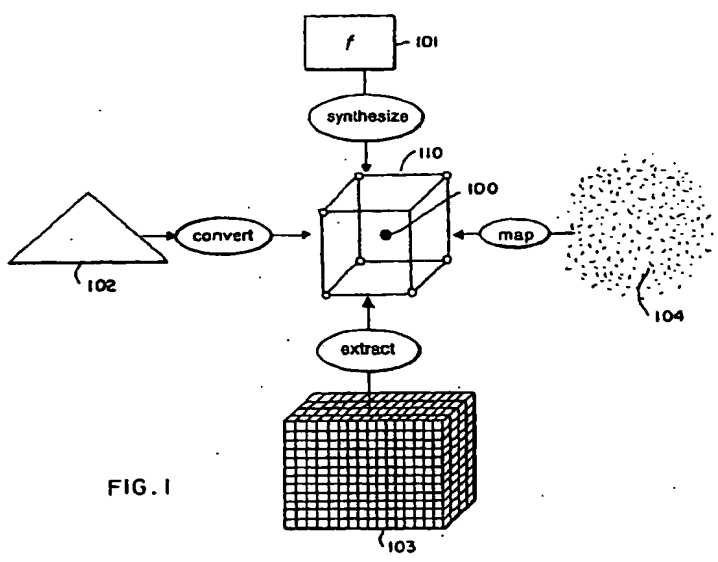


FIG. 1



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 11 5915

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,A	GROSSMAN J P ET AL: "POINT SAMPLE RENDERING" PHOTOREALISTIC RENDERING IN COMPUTER GRAPHICS. PROCEEDINGS OF THE EUROGRAPHICS WORKSHOP ON RENDERING, XX, XX, 29 June 1998 (1998-06-29), pages 181-192,331, XP001050461 * abstract * * chapters 2.2 and 3 *	1-14	G06T17/20
A	GIBSON S ET AL: "3D CHAINMAIL: A FAST ALGORITHM FOR DEFORMING VOLUMETRIC OBJECTS" PROCEEDINGS OF THE 1997 SYMPOSIUM ON INTERACTIVE 3D GRAPHICS. PROVIDENCE, APR. 27 - 30, 1997, PROCEEDINGS OF THE SYMPOSIUM ON INTERACTIVE 3D GRAPHICS, NEW YORK, ACM, US, 27 April 1997 (1997-04-27), pages 149-154, XP000725366 ISBN: 0-89791-884-3 * abstract * * chapters "Data Structures" and "Object Deformation: 3D ChainMail" * * figures 1-3 *	1-14	<div>TECHNICAL FIELDS SEARCHED (Int.Cl.7)</div> <div>G06T</div>
A	US 5 187 660 A (DZIK STEVEN C ET AL) 16 February 1993 (1993-02-16) * column 1, line 35 - line 57 * * figure 8 *	1-14	
		-/--	
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 28 April 2003	Examiner Engels, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 11 5915

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,A	M. LEVOY, T. WHITTED: "The Use of Points as Display Primitives" TECHNICAL REPORT 85-022, COMPUTER SCIENCE DEPARTMENT, UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL, January 1985 (1985-01), XP002239509 * chapters 1, 4.1 and 4.3 * * figure 1 *	1-14	
D,A	US 5 781 194 A (PONOMAREV ROMAN E ET AL) 14 July 1998 (1998-07-14) * column 2, line 65 - column 3, line 33 *	1-14	
A	US 4 953 087 A (CRAWFORD CARL R) 28 August 1990 (1990-08-28) * abstract * * figure 6 *	1-14	
A	US 4 343 037 A (BOLTON MARTIN J P) 3 August 1982 (1982-08-03) * column 15, line 47 - column 17, line 47 * * figures 31-35 *	1-14	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
Place of search MUNICH		Date of completion of the search 28 April 2003	Examiner Engels, A
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons a : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 11 5915

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-04-2003

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5187660	A	16-02-1993	NONE		
US 5781194	A	14-07-1998	NONE		
US 4953087	A	28-08-1990	NONE		
US 4343037	A	03-08-1982	GB	2051525 A	14-01-1981
			CA	1141468 A1	15-02-1983
			DE	3022454 A1	05-02-1981
			FR	2466061 A1	27-03-1981
			GB	2061074 A ,B	07-05-1981